



2007-11

Hastily formed networks (HFN) for disaster relief

Steckler, Brian

Monterey, California, Naval Postgraduate School

<http://hdl.handle.net/10945/37955>



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>

Naval Postgraduate School

Hastily Formed Networks (HFN) for Disaster Relief



Unclassified Information Brief
For NSF FIND Program Workshop – 27-28 NOV 07

Prepared by Professor Brian Steckler, Executive Director NPS HFN Center



Agenda

- HFNs Defined
- NPS HFN Related Activities Past 3 Years
- Interoperability Challenges
- Network Design Considerations



HFN Defined.....

- **A network formed quickly to respond to a crisis, emergency, or urgency, and is disbanded when the job is done.**
- **This definition encompasses three kinds of networking:**
 - **Physical (e.g., telecommunications systems, distribution systems)**
 - **Social (e.g., contacts networks, interorganizational, civ-mil)**
 - **Information flow (e.g., searches, pushes, pulls, workflows, chat, email, collaboration tools)**



Power, Lift and Comms

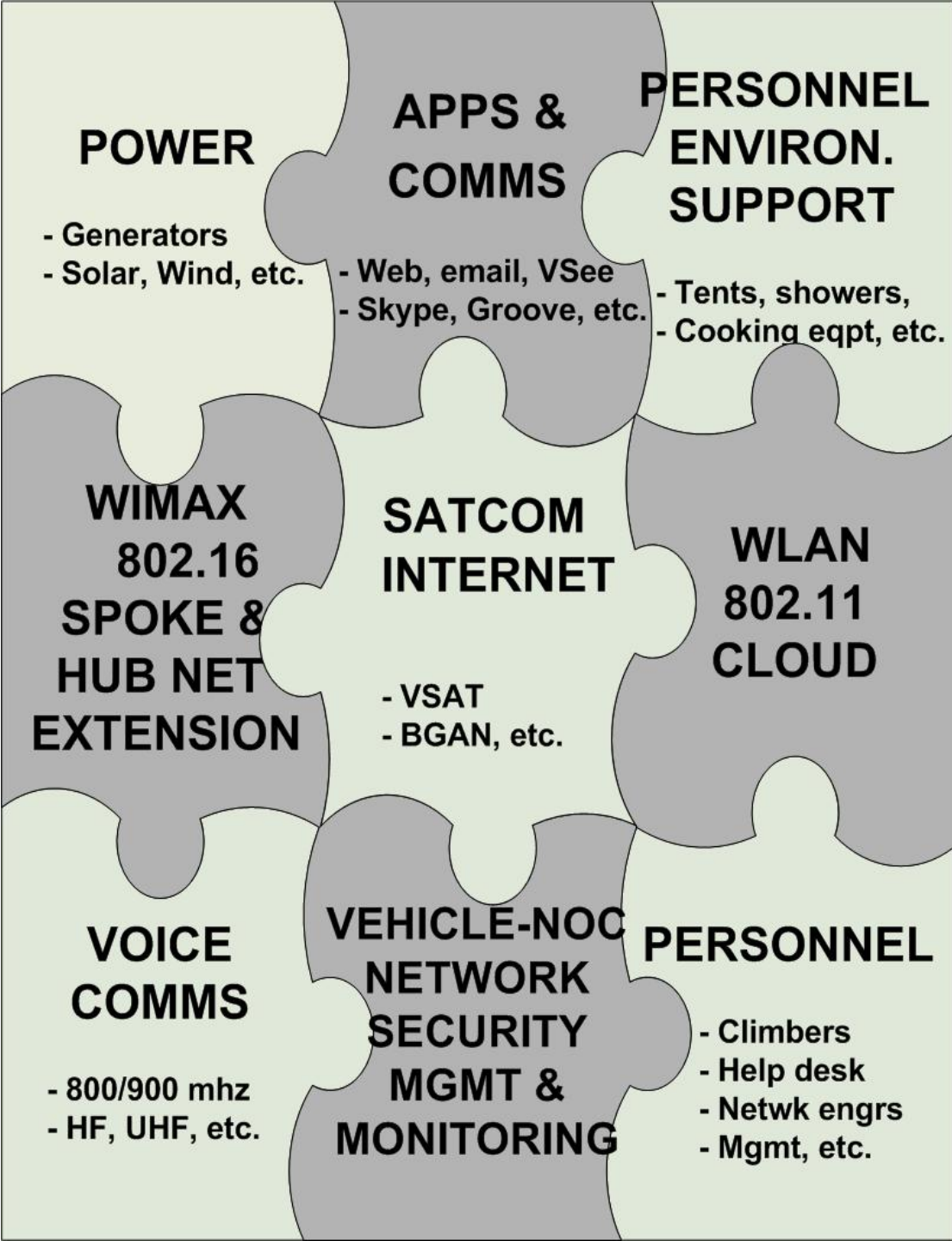
- **Power**. Required to run all aspects of any human activity in a disaster zone; including medical, emergency services (stabilization), security, search/rescue, infrastructure repair, and most importantly communications
- **Lift**. There must be multiple forms of transportation for people, equipment of all types (power, rescue, medical, people, communications, etc)
- **Communications**. In order to coordinate all aspects of a relief effort there must be multiple redundant methods of communicating within the disaster zone, from inside the disaster zone to the outside, and from the outside in to the disaster zone.

NOTE: All of these must be available and deployed simultaneously in any disaster response. They are 100% interdependent and of equal importance.



THE HFN PUZZLE.....

Surrounded
by the Civil-
Military
Boundary....
and
Improvisation





Past/Present NPS HFN Activities

- SE Asian Tsunami (Jan-May 05)
- Hurricane Katrina (Sep-Oct 05)
- USNS Mercy Humanitarian Mission to SE Asia (Summer 06)
- Strong Angel III (August 2005)
- Operation Golden Phoenix (July 07)
- USNS Comfort Latin/South America Humanitarian Mission (Summer 07)

But we will focus a bit on Katrina here.....

Areas of Operation





Hurricane Katrina.....

- The Problems:
 - No power
 - No fiber/copper infrastructure
 - No push-to-talk comms to speak of
 - Cellular svc mostly jammed / overwhelmed
 - SatPhone svc mostly jammed / overwhelmed
 - Not enough satellite eqpt suites available
 - No Internet access (web, email, VOIP)
 - No technical people resources available



HFNs - A Viable Comms Solution.....

- SATCOM Internet Reachback
- 802.11 (WiFi) and 802.16 (WiMax)
- Broadband Internet, Web, Email
- Voice Over IP (basic dial-tone)
- Skype (free internet phone)
- Groove (collaboration solution)

Network Infrastructure

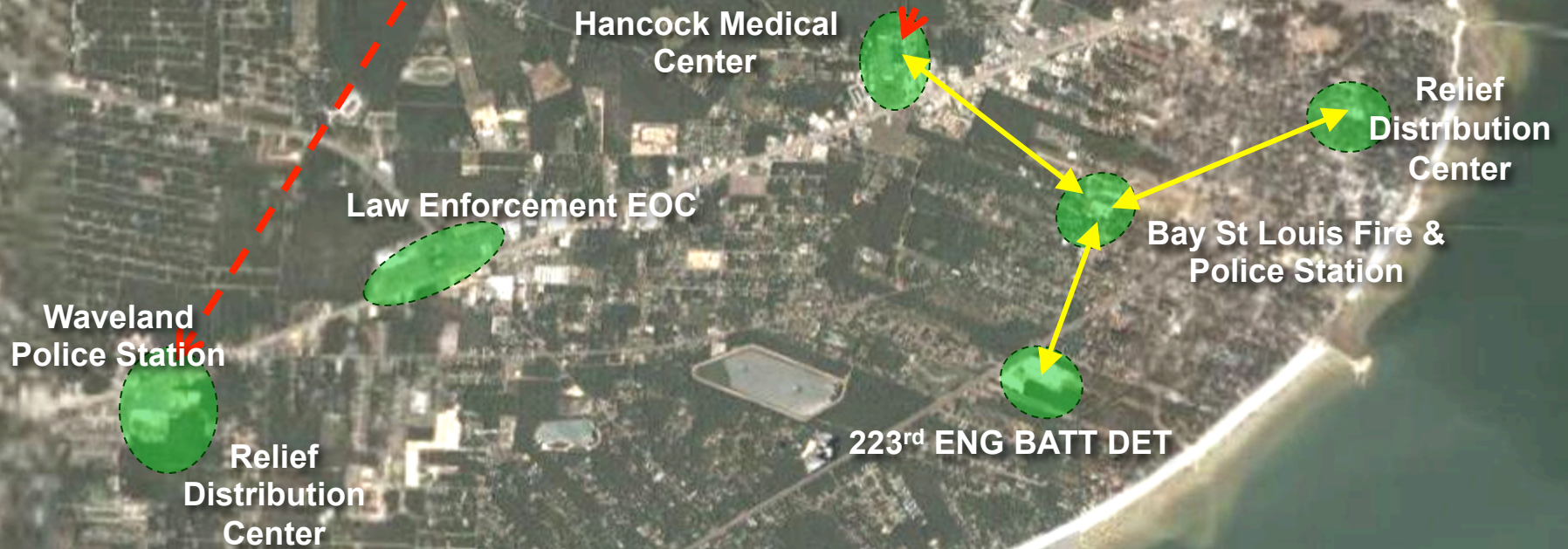


Image © 2005 DigitalGlobe

© 2005 Google

NPS DET 1 NETWORK

- Tachyon Satellite 
- 802.16 Wireless 
- 802.11 Wireless 

The HFN POSTERCHILD.....





Interoperability (and other) Challenges

- **Who's In Charge of Comms ?**
- **Managing Interfering Multiple Networks**
- **Emergency Response vs Command/Control vs Public Access Networks**
- **Lack of PTT Radio Interoperability and the Emergence of LMRoIP**
- **Dependence on UHF, Cellular, and Power Infrastructure (that may not be available)**
- **Effects of No Common Operating Picture (COP)**
- **VoIP Can Be an Equalizer (but not secure)**
- **Building Resilient and Survivable Infrastructure in the Future (wireless and power keys ?)**



Network Design

Questions To Ask Ourselves

- **How To Avoid the “Poster Child” Next Time?**
- **Wired vs Wireless Infrastructure?**
- **Will SATCOM and WiMAX Change the Economic and Physical Landscape?**
- **Next Generation Wireless Mesh (will clients become servers – aka Microsoft Venice)?**
- **U.S. vs Global Design Considerations?**
- **Prioritization of Users (GETS/WPS of the Internet)?**
- **Power, Power, Power !?!?**



QUESTIONS ?

Brian Steckler, Director,
NPS Hastily Formed Networks Center

steckler@nps.edu or 831.402.1584